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C#####
C
C Need to set NUMDAYS to correct value eventually, sed it in like in runit.sh
C
    parameter (NUMDAYS=SED_NUMDAYS)
C
C#####

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include '..comdeck'

real advuu(im,jm),advvv(im,jm),advua(im,jm),advva(im,jm)
integer fin,fout,ii,jj,il,VAR_BED,INCORE,FLVCPRM,SC,M
real Heq,kd,dpthcut,totdpthcut,ndays,eromass_gcm2,addcut,
+ newccoh10,newcncoh10,newccohar,newcncohар,
+ scourdpth_eqbdens
character*80 STR_LINE
REAL OVERMASS(IM,JM)

RCA_TACT=15.
fin = 31
fout = 32
KSED = 7

c READ BED PROPERTIES -----
OPEN(UNIT=407,FILE='..bed.sdf')
READ (407,'(A80)') STR_LINE
READ (407,*)!NSEDBEG,NSBED,Z0BCOH,CFMIN,TAUOPT
c XNSBED=FLOAT(NSBED)

READ (407,'(A80)') STR_LINE
READ (407,*) VAR_BED !,NCALC_BL,CONTAU,DEP_COEFF
READ (407,'(A80)') STR_LINE
READ (407,*)(D50(K),K=1,KSED)
DO K=1,KSED
    LOGD50(K)=LOG(D50(K))
ENDDO
READ (407,'(A80)') STR_LINE
READ (407,*) !(TCRDPS(K),K=1,KSED)
READ (407,'(A80)') STR_LINE
READ(407,*) !(TAUCRS(K),K=1,KSED)

! Read in Initial Erosion Data
IF(VAR_BED.EQ.1)THEN
C Variable erosion rate data
C
OPEN(UNIT=20,FILE='..core_field.sdf')

READ(20,*) INCORE
DO 5 J=JM,1,-1
    READ(20,10) (CORENO(I,J),I=1,IM)
5  CONTINUE
10  FORMAT (20I3)
END IF

READ (407,'(A80)') STR_LINE
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READ (407,*) !(SCLOC(SC),SC=1,SCMAX)
READ (407,'(A80)') STR_LINE
READ (407,*) !(TAUCRITE(SC),SC=1,SCMAX)
READ (407,'(A80)') STR_LINE
DO 115 SC=1,SCMAX
    READ(407,*) (ENRATE(SC,M),M=1,ITBM)
115 CONTINUE
C
C Read in Consolidation Information
C
    READ (407,'(A80)') STR_LINE
    READ (407,*) DTHICKM
    READ (407,'(A80)') STR_LINE
    READ (407,*) DBINF(1),DBSUR(1),DBEXC(1),DSAND,FLVCPRM
    READ (407,'(A80)') STR_LINE
    READ (407,*) DCONR(1),DSWER
C Convert rates from 1/day to 1/sec
C     DCONR=DCONR/(24*3600)
        DSWER=DSWER/(24*3600)

    READ (407,'(A80)') STR_LINE
    READ (407,*) TAUSURF(1),EROA(1),ERON(1),EROM(1),ECRIT(1)

    CLOSE(407)

    IF (FLVCPRM.NE.1.) THEN
        DO N=2,INCORE
            DBINF(N) = DBINF(1)
            DBSUR(N) = DBSUR(1)
            DBEXC(N) = DBEXC(1)
            DCONR(N) = DCONR(1)
            TAUSURF(N)= TAUSURF(1)
            EROA(N) = EROA(1)
            ERON(N) = ERON(1)
            EROM(N) = EROM(1)
            ECRIT(N) = ECRIT(1)
        ENDDO
    ELSE
        OPEN(409,FILE='..//VAR_CONSOL_PARAMS.prn',ACTION='READ')
        READ(409,*)
        DO N=1,INCORE
            READ(409,*) M,DBSUR(N),DBINF(N),DBEXC(N),DCONR(N),TAUSURF(N)
                ,EROA(N),EROM(N),ERON(N),ECRIT(N)
c      +      ,TAUDEPTOP(N) ! RMathew, 11/06/2011
c      +      ,FLUFFA(N), FLUFFN(N) ! DManian 110811
        ENDDO
        CLOSE(409)
    ENDIF

c    NOW MODIFY RESTART FILE -----
open(11,FORM='UNFORMATTED',file='restart') ! last restart file from sediment transport run

c read old sediment transport results
    READ (11)
        . INT,DZR,Z,ZZ,DZ,DZZ,H,H1,H2,D,DT,ANG,
        . ART,ARU,ARV,DUM,DVM,FSM,COR,CURV42D,WUBOT,WVBOT,

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. UA,UAB,VA,VAB,EL,ELB,ETF,ET,ETB,EGF,EGB,UTF,UTB,
. VTF,VTB,ADVUU,ADVVV,ADVUA,ADVVA,AAM2D,AAM,KM,KH,KQ,Q2,Q2B,
. Q2L,Q2LB,L,U,UB,W,V,VB,T,TB,S,SB,RHO,RMEAN,TMEAN,SMEAN,
. CONC1,CONC1B,CBC,TDIF,SDIF,CDIF1,
+ N24CNT,CSED1,CSED2,CSED1B,CSED2B,FLOCSET,DZBL,PSUS,
+ TAUMAX,TAUCUR,TSED,QBSED,TRANS,EBL,
+ EBTOT,EBMAX,EBCUR,PSED1,PSED2,BEDTH,FRAC0,ACTLAY,CARMOR,
+ FR,NCNT,NHRCNT,NDTCNT,TAU
+ ,P,BULKDEN,TSED0,LAYER,BLFLAG,CBL,D50AVG,PDEP,DLAYER,DMASS,
+ DBULK,TAUCON,SFSVC,Z0N,CSEDS,CSEDS1,QSED,DBL2AC,DDD2AC,
+ EE2AC,TOTALMASSOUT,TAUCOR,DTOP,DPEP,DAVG,UFSED,DDD2,DBL2
+ ,EE2
+ ,MAX_SCOUR
+ ,D50AVG_GR      ! DManian 081111 (to keep D50 for GR constant)
+ ,CONSOLTOP      ! DManian 110411
+ ,EXPOSDELYR    ! DManian 110411
+ ,FLUFFTOP
+ ,H_IC
READ(11) DTI, TIME

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C get equilibrium density for calculating scour depths at equilibrium density
C and active/archive layer composition following scour using depth intervals
C calculated at equilibrium density

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DO J=2,JMM1
  DO I=2,IMM1
    ICORE=CORENO(I,J)
    OVERMASS(I,J)=LAYER(1,I,J)*TSED(1,I,J)
    IF(FLUFFTOP(I,J).NE.0) THEN
      OVERMASS(I,J)=OVERMASS(I,J)+DMASS(FLUFFTOP(I,J),I,J)
    ENDIF
    IF(FLUFFTOP(I,J).NE.0) THEN
      LTOP=FLUFFTOP(I,J)+1
      DBULKEQ(FLUFFTOP(I,J),I,J)=DBSUR(ICORE)
    ELSE
      LTOP=DTOP(I,J)
    ENDIF
    DO LL=LTOP,DLAYMAX
      IF(DLAYER(LL,I,J).EQ.1)THEN
        IF((DAVG(LL,I,J).LT.150).OR.SUM(DPEP(1:4,LL,I,J)).GT.0.15) THEN
          DBULKEQ(LL,I,J)=DBINF(ICORE)-(DBINF(ICORE)
          -DBSUR(ICORE))*EXP(-DBEXC(ICORE)*OVERMASS(I,J))
        ELSE
          DBULKEQ(LL,I,J)=DSAND
        ENDIF
      ENDIF
    ENDDO
  ENDDO
ENDDO

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c open(fout,file='6in_D50_end_map')
ndays = NUMDAYS
open(fout,file='scourcells_rev.out')
open(fin,file='..//propsscourK2.txt',form='formatted')
901 read(fin,*,end=999)ii,jj,Heq,kd
dpthcut = 100.*(Heq+8.-H(ii,jj))*(1.-exp(-kd*ndays)) ! cm
eromass_gcm2 = 0.

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totdpthcut = dpthcut
scourdpth_eqbdens = 0.
C active layer
if(dpthcut.GT.0..AND.TSED(DLAYMAX+1,ii,jj).GT.0.) then
  dpthcut = dpthcut - (TSED(1,ii,jj)/BULKDEN(1,ii,jj))
  eromass_gcm2 = eromass_gcm2+TSED(1,ii,jj)
  scourdpth_eqbdens = TSED(1,ii,jj)/BULKDEN(1,ii,jj)
  TSED(1,ii,jj) = 0.
  LAYER(1,ii,jj) = 0.
endif
C deposited layers
ll = DTOP(ii,jj)
do while ((dpthcut.GT.0).AND.(ll.LE.DLAYMAX))
  if(DMASS(ll,ii,jj).GT.0.) then
    addcut = (DMASS(ll,ii,jj)/(1.625*(DBULK(ll,ii,jj)-1.)))
    if (addcut.gt.dpthcut) then
c Remove only the necessary thickness from layer
      scourdpth_eqbdens = scourdpth_eqbdens + (DMASS(ll,ii,jj)/(1.625*(DBULKEQ(ll,ii,jj)-1.))) *
+      (dpthcut/(DMASS(ll,ii,jj)/(1.625*(DBULK(ll,ii,jj)-1.))))
      eromass_gcm2 = eromass_gcm2 +1.625*(DBULK(ll,ii,jj)-1.)*dpthcut
      DMASS(ll,ii,jj) = DMASS(ll,ii,jj)-1.625*(DBULK(ll,ii,jj)-1.)*dpthcut
      dpthcut = 0.
      ll = ll-1      ! This is to neutralize the ll=ll+1 below
    else
c Empty out layer
      scourdpth_eqbdens = scourdpth_eqbdens + (DMASS(ll,ii,jj)/(1.625*(DBULKEQ(ll,ii,jj)-1.)))
      dpthcut = dpthcut - addcut
      eromass_gcm2 = eromass_gcm2+DMASS(ll,ii,jj)
      DMASS(ll,ii,jj) = 0.
      DLAYER(ll,ii,jj) = 0.
      DBULK(ll,ii,jj)=DBSUR(CORENO(ii,jj))
      TAUCON(ll,ii,jj)=TAUSURF(CORENO(ii,jj))
      DO KK = 1,KSED
        DPEP(KK,ll,ii,jj) = 0.
      ENDDO
      FLUFFTOP(ii,jj) = 0.
    endif
  endif
  ll = ll+1
enddo
DTOP(ii,jj) = ll
if (DTOP(ii,jj).gt.DLAYMAX) then
  write(*,*)'DTOP > DLAYMAX. This shouldn"t happen!!'
  DTOP(ii,jj) = DLAYMAX
endif
TSED(2,ii,jj) = DMASS(DTOP(ii,jj),ii,jj)
c Change mass fractions and erosion properties
TAUCOR(2,ii,jj)=TAUCON(DTOP(ii,jj),ii,jj)
DAVG(DTOP(ii,jj),ii,jj)=0.
DO KK=1,KSED
  P(KK,2,ii,jj)=DPEP(KK,DTOP(ii,jj),ii,jj)
  DAVG(DTOP(ii,jj),ii,jj)=P(KK,2,ii,jj)*LOGD50(KK)
  .  +DAVG(DTOP(ii,jj),ii,jj)
ENDDO
DAVG(DTOP(ii,jj),ii,jj)=EXP(DAVG(DTOP(ii,jj),ii,jj))
IF (DTOP(ii,jj).GT.CONSLTOP(ii,jj)) THEN

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CONSOLTOP(ii,jj) = DTOP(ii,jj)
ENDIF

if (eromass_gcm2.gt.0.) then
  tmpth = 0.
  tactcoh = 0.
  tactncoh = 0.
  tarccoh = 0.
  tarcncoh = 0.
  tmpth = tmpth + TSED(1,ii,jj)/BULKDEN(1,ii,jj) ! active layer
  if(tmpth.LE.RCA_TACT) then
    tactcoh = tactcoh + TSED(1,ii,jj)*SUM(P(1:4,1,ii,jj))
    tactncoh = tactncoh + TSED(1,ii,jj)*(1.-SUM(P(1:4,1,ii,jj)))
  endif
  DO LL = DTOP(ii,jj), DLAYMAX
    tmpth = tmpth + DMASS(LL,ii,jj)/(1.625*(DBULKEQ(LL,ii,jj)-1)) ! deposited layers, cm
    if(tmpth.LE.RCA_TACT) then
      tactcoh = tactcoh + DMASS(LL,ii,jj)*SUM(DPEP(1:4,LL,ii,jj))
      tactncoh = tactncoh + DMASS(LL,ii,jj)*(1.-SUM(DPEP(1:4,LL,ii,jj)))
    else
      if((tmpth - DMASS(LL,ii,jj)/(1.625*(DBULKEQ(LL,ii,jj)-1))).LT.RCA_TACT) then
        tactcoh = tactcoh + DMASS(LL,ii,jj)*SUM(DPEP(1:4,LL,ii,jj))*  

+          ((RCA_TACT-(tmpth - DMASS(LL,ii,jj)/(1.625*(DBULKEQ(LL,ii,jj)-1))))/  

+           (DMASS(LL,ii,jj)/(1.625*(DBULKEQ(LL,ii,jj)-1))))  

        tactncoh = tactncoh + DMASS(LL,ii,jj)*(1.-SUM(DPEP(1:4,LL,ii,jj)))*  

+          ((RCA_TACT-(tmpth - DMASS(LL,ii,jj)/(1.625*(DBULKEQ(LL,ii,jj)-1))))/  

+           (DMASS(LL,ii,jj)/(1.625*(DBULKEQ(LL,ii,jj)-1))))  

  

        tarccoh = tarccoh + DMASS(LL,ii,jj)*SUM(DPEP(1:4,LL,ii,jj))*  

+          (tmpth - RCA_TACT)/(DMASS(LL,ii,jj)/(1.625*(DBULKEQ(LL,ii,jj)-1)))  

        tarcncoh = tarcncoh + DMASS(LL,ii,jj)*(1.-SUM(DPEP(1:4,LL,ii,jj)))*  

+          (tmpth - RCA_TACT)/(DMASS(LL,ii,jj)/(1.625*(DBULKEQ(LL,ii,jj)-1)))  

      else
        tarccoh = tarccoh + DMASS(LL,ii,jj)*SUM(DPEP(1:4,LL,ii,jj))
        tarcncoh = tarcncoh + DMASS(LL,ii,jj)*(1.-SUM(DPEP(1:4,LL,ii,jj)))
      endif
    endif
  ENDDO
  DO LL = 3, LAYMAX
    tmpth = tmpth + TSED(LL,ii,jj)/BULKDEN(LL,ii,jj) ! parent layers, cm
    if(tmpth.LE.RCA_TACT) then
      tactcoh = tactcoh + TSED(LL,ii,jj)*SUM(P(1:4,LL,ii,jj))
      tactncoh = tactncoh + TSED(LL,ii,jj)*(1.-SUM(P(1:4,LL,ii,jj)))
    else
      if((tmpth - TSED(LL,ii,jj)/BULKDEN(LL,ii,jj)).LT.RCA_TACT) then
        tactcoh = tactcoh + TSED(LL,ii,jj)*SUM(P(1:4,LL,ii,jj))*  

+          ((RCA_TACT-(tmpth -  

TSED(LL,ii,jj)/BULKDEN(LL,ii,jj))/(TSED(LL,ii,jj)/BULKDEN(LL,ii,jj)))  

          tactncoh = tactncoh + TSED(LL,ii,jj)*(1.-SUM(P(1:4,LL,ii,jj)))*  

+            ((RCA_TACT-(tmpth -  

TSED(LL,ii,jj)/BULKDEN(LL,ii,jj))/(TSED(LL,ii,jj)/BULKDEN(LL,ii,jj)))  

  

        tarccoh = tarccoh + TSED(LL,ii,jj)*SUM(P(1:4,LL,ii,jj))*  

+          (tmpth - RCA_TACT)/(TSED(LL,ii,jj)/BULKDEN(LL,ii,jj))  

        tarcncoh = tarcncoh + TSED(LL,ii,jj)*(1.-SUM(P(1:4,LL,ii,jj)))*  

+          (tmpth - RCA_TACT)/(TSED(LL,ii,jj)/BULKDEN(LL,ii,jj))
      endif
    endif
  end

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else
    tarccoh = tarccoh + TSED(LL,ii,jj)*SUM(P(1:4,LL,ii,jj))
    tarcncoh = tarcncoh + TSED(LL,ii,jj)*(1.-SUM(P(1:4,LL,ii,jj)))
endif
endif
ENDDO

write(fout,'(2I6,10F14.3')ii,jj,totdpthcut,H1(ii,jj)*H2(ii,jj),
     .   10.*eromass_gcm2,H(ii,jj)-8.,ndays,scourdpth_eqbdens, ! output dpthcut in cm, eromass in
kg/m^2
     +      tactcoh, tactncoh, tarccoh, tarcncoh ! totdpthcut-dpthcut is the actual depth of scour in given
time chunk
           ! coh/ncoh in active/archive layers in gm/cm2
endif
goto 901
999 close(fin)
close(fout)
END

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